Management of synchronous renal neoplasm and abdominal aortic aneurysm

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Objectives: **Renal neoplasm (RN) and abdominal aortic aneurysm (AAA) are occasionally discovered concurrently. The approach to synchronous malignancy and aortic aneurysm is controversial.**

Methods: **Between 1981 and 1999, concurrent RN and AAA were diagnosed in 50 patients at the Cleveland Clinic Foundation. Twenty-three patients were managed conservatively because of small asymptomatic AAA or metastatic disease; these patients were excluded from the study. The remaining 27 patients underwent operative management of both entities with a staged or simultaneous approach, and they form the basis of this article.**

Results: **AAA diameter ranged from 4.8 to 13 cm (mean, 6.0 ± 1.8 cm). RNs were managed with radical nephrectomy in 11 patients (41%), partial nephrectomy in 10 patients (37%), or both in 6 patients with bilateral renal tumors (22%). The AAA repair was performed at the time of the urologic procedure in 11 patients (41%), before the urologic procedure in 13 patients (48%), or after the urologic procedure in 3 patients (11%). The AAA was addressed with open surgical repair in 24 patients (89%); recently, three patients (11%) underwent endovascular repair of the aneurysm and staged partial nephrectomy. The incidence of major perioperative complications was 23% (6 patients). Acute renal failure was the most common complication (3 [11%]) followed by acute respiratory failure (2 [7.4%]), pulmonary embolism (1 [3.7%]), and stroke (1 [3.7%]). At the mean follow-up of 57 months, there were no graft infections reported. The 5-year overall and cancer-specific survival rates were 62% and 81%, respectively. There was a significant difference in 5-year cancer-specific survival when comparing patients managed simultaneously versus staged (80% versus 35%, *P* =.007).**

Conclusions: **The concurrent presentation of RN and AAA should not discourage one from treating both entities simultaneously because long-term survival is common. Endovascular repair of AAA holds promise as an attractive strategy in these complex patients. (J Vasc Surg 2000;32:1102-10.)**

Abdominal aortic aneurysm (AAA) is a disease of aging. As such, the frequency of AAA increases with advancing age of the general population.[1] Intra-abdominal malignancies have been found in up to 4% of patients at the time of aortic reconstruction.[2] A staged approach is usually preferred in malignancies involving the gastrointestinal tract to avoid contamination of the prosthetic graft.[3] Similarly, when the malignancy involves the kidney, staged resection similar to the approach recommended for the gastrointestinal tract can be done, which individualizes the order of resection according to the size of the AAA and the stage of the malignant lesion.[4] Simultaneous resection may be undertaken in selected patients. This approach avoids a second major operative procedure and should not carry an increased risk of graft contamination, because the upper urinary tract is often sterile.

Incidental renal neoplasms (RNs) are being detected with greater frequency because of the increased use of imaging studies. The management of small, incidental RNs is still controversial. In most patients, nephron-sparing surgery (NSS) rather than radical nephrectomy can be safely performed, especially in tumors where the largest dimension is less than or equal to 4 cm.[5] In this manner, the loss of

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renal mass will be minimized in patients with compromised renal function, as is sometimes encountered in patients with aortic disease. The use of endovascular aortic stenting for the management of AAA is evolving, with an increased utility of this technique in the last few years.[6] This new modality holds potential as a solution to the problem of concurrent or closely spaced aneurysm and urologic procedures. The current study was undertaken to evaluate our experience in the management of patients presenting with AAA in association with renal malignancy.

MATERIAL AND METHODS

From 1981 to 1999, concurrent AAA and RN were diagnosed in 50 patients at the Cleveland Clinic Foundation. Patient records were reviewed to determine the form, size, presentation, management, and complications of the AAA and the site, presentation, pathologic condition, complications, and management of the renal tumor site. Twenty-three patients were managed conservatively because of small, asymptomatic (mean, 4.3 ± 0.9 cm) AAA or metastatic renal tumor and were excluded from the study. The remaining 27 patients were treated surgically and form the basis of this report.

Patient characteristics. Twenty-one aneurysms were asymptomatic, whereas six patients had symptoms from the AAA. RN was considered to be an "incidental finding" in patients whose diagnostic evaluation was not initiated by systemic or genitourinary complaints related to the tumor. RN was diagnosed incidentally in 22 patients, whereas five patients had hematuria, flank pain, or both.

Patients were evaluated by means of a thorough physical examination, a complete metabolic panel of tests including liver function tests, a complete blood count, a chest radiography, and one or more abdominal imaging studies such as computerized tomographic (CT) scanning and ultrasound scanning. Angiography or magnetic resonance imaging was routinely performed in all patients with AAA and RN. Recently, three-dimensional spiral abdominal CT has been found to be helpful in delineating the details of the renal vasculature, which obviates the need for angiography in patients undergoing NSS alone. This approach is being used routinely in our institute before NSS for renal tumors. Chest CT was performed in the presence of chest radiography with abnormal findings. Bone scan was performed if there were symptoms suggestive of bone metastasis or if alkaline phosphatase was elevated. Noninvasive cardiac stress testing, either dobutamine echocardiography or the dipyridamol thallium stress test, was administered to all patients before they underwent elective surgical procedures.

Surgical treatment. Surgical management of RN was based on tumor size, location, level of overall renal function, and technical feasibility of a nephron-sparing operation. NSS was performed in patients with bilateral tumors, patients with solitary kidney, patients with chronic renal insufficiency, and patients with general systemic disease who are at risk of progressive deterioration of renal function. The management of AAA was determined by the size, the site, the presentation, the technical feasibility of open surgical repair versus endovascular stenting, and the general medical condition of the patient.

Tumor characteristics. Pathologic tumor staging was determined according to the most recent TNM system proposed by the International Union Against Cancer.[7] All tumors were measured during pathologic examination, and tumor size was reported as the largest dimension of the lesion.

Follow-up. All patients were followed up postoperatively at 1, 3, 6, and 12 months and once yearly thereafter; measurements of the serum creatinine level, chest radiography, and either abdominal sonography or CT were used in the patients' evaluation. Postoperative data were obtained by the review of medical records and, when necessary, by contacting surviving patients or their local physicians. The mean follow-up period in this series was 57 ± 8 months (range, 6-131).

Statistical analysis. Two-sample t tests were used to compare all mean values. A Pearson χ^2 test was used to compare all percentages. Kaplan-Meier survival estimates with log-rank tests were used in all survival data analysis.

RESULTS

Patient characteristics. Twenty-five patients were male, and two patients were female. The ages ranged from 58 to 80 years (mean, 69 ± 5 years). Twenty-seven patients had their AAA managed operatively. The AAA size for these patients ranged from 4.8 to 13 cm (mean, 6.0 ± 1.8 cm). The AAA site was infrarenal in 23 patients and juxtarenal in four patients. Twenty-four patients had open surgical repair, and three patients had endovascular repair (these three patients had staged partial nephrectomy) and were treated in the last 2 years of the study. Aortic reconstruction consisted of 5 aortobifemoral bypass grafts, 9 aortobi-iliac bypass grafts, and 10 tube grafts.

All patients included in this study had localized and histopathologic-proved renal cell carcinoma (RCC)

Table I. Patient characteristics in both groups

	Simultaneous (group 1, n = 11)	*Staged (group 2, n = 16)*
Mean age (y)	70	68
Sex		
Male	10	15
Female	1	1
Incidental detection of RN	8	14
Incidental detection of AAA	10	11
Preoperative SCr	1.36	1.34
Radical nephrectomy	5	6
NSS	6	10
Mean follow-up (mo)	40.4	68.5
Tumor size (cm)	5.5	6.8

AAA, Abdominal aortic aneurysm; *NSS,* nephron-sparing surgery; *RN,* renal neoplasm, *SCr,* mean serum creatinine level (mg/dL).

Table II. Tumor characteristics and outcome in both groups

	Simultaneous (group 1, n = 11)	*Staged (group 2, n = 16)*
Tumor stage		
T1a	1	6
T1b	4	6
T3a	3	3
T3b	3	0 (1 was T2 TCC)
Tumor grade		
I	0	1
II	4	9
III	7	6
Tumor focality		
Unifocal	8	9
Multifocal	3	7
5-year survival (%)	80	35
Recurrent RCC	3	5
Outcome		
Alive	8	5
Dead metastatic	3	5
Dead NED	0	6
Postoperative SCr	1.9	1.8

NED, No evidence of disease; *RCC,* renal cell carcinoma; *SCr,* mean serum creatinine level (mg/dL); *TCC,* transitional cell carcinoma.

(n = 26) or transitional cell carcinoma (TCC) (n = 1). Unilateral tumors were present in 21 patients; six patients had bilateral RN. Histopathologic examination of the surgical specimens revealed clear cell carcinoma in 23 patients, granular and clear cell carcinoma in 3 patients, and TCC in 1 patient. Seventeen of these patients had a unifocal lesion, whereas 10 had a multifocal tumor. The mean tumor size was 5.7 ± 2.8 cm (range, 2-15 cm). TNM classification was as follows: T1a in 7 patients, T1b in 10, T3a in 6, T3b in 3, and stage T2 TCC in 1. The tumor nuclear grade was I to II in 14 patients and grade III in 13 patients. There was neither nodal involvement nor distant metastasis in any of these patients.

Surgical treatment. The local extent of the renal tumor was estimated from radiographic and operative reports. The mean preoperative serum creatinine level was 1.4 ± 0.4 mg/dL (range, 0.8-2.7 mg/dL). Radical nephrectomy was used in the management of 10 patients with unilateral RCC. Indications of NSS (partial nephrectomy) were unilateral RCC in 10 patients (3 with chronic renal insufficiency, 2 with a solitary kidney, 1 with a horseshoe kidney, 2 with nephrolithiasis, and 2 with bilateral renal artery disease, of whom 1 underwent aortorenal bypass grafting). Six patients had bilateral RCC (synchronous in four and asynchronous in two) and were managed with a partial nephrectomy on one side and radical nephrectomy on the contralateral side. One patient underwent nephroureterectomy for TCC.

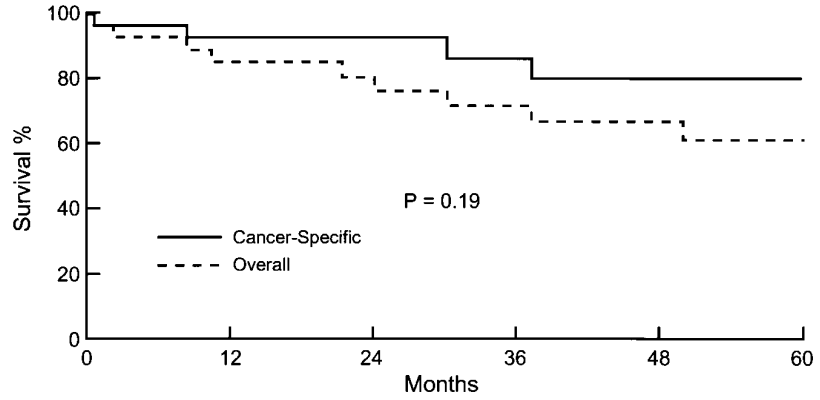

Fig 1. Overall and cancer-specific survival for patients with AAA coexisting with RN.

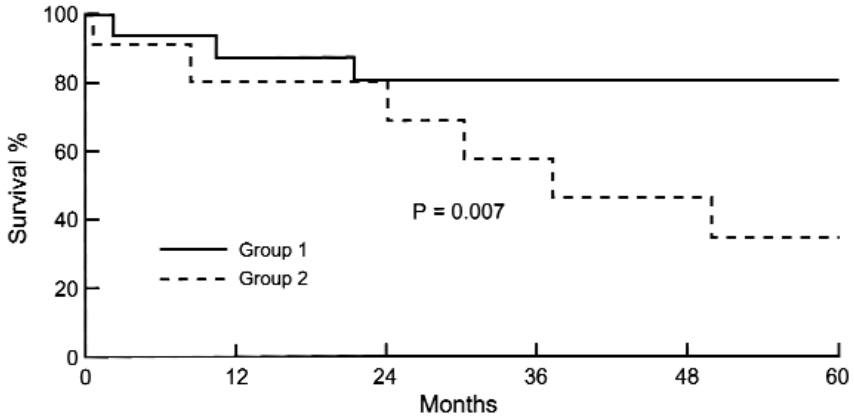

Fig 2. Overall survival for patients who underwent simultaneous versus staged approach for AAA coexisting with RN.

The AAA repair was performed at the time of the urologic procedure (11 [41%]), before the urologic procedure (13 [48%]), or after the urologic procedure (3 [11%]). The latent period between AAA repair and the urologic procedure in the staged approach was 97 ± 14 days. Of the 11 (41%) patients who underwent simultaneous procedures, 2 underwent partial nephrectomy, 5 underwent radical nephrectomy, and 4 underwent a partial nephrectomy on one side and a radical nephrectomy on the contralateral side.

Hospital course and renal function. The incidence of perioperative complications was 23% (six patients). Acute renal failure was the most common complication (3 [11%]), followed by acute respiratory failure (2 [7.4%]), deep vein thrombosis and pulmonary embolism (1 [3.7%]), and stroke (1 [3.7%]). One patient had an intraoperative gallbladder injury. The mean preoperative creatinine level was 1.35 ± 0.46 mg/dL, rising to 1.8 ± 0.7 mg/dL after both procedures were complete. None of the patients who underwent NSS had any postoperative urine leakage or urinoma formation. There are no aortic graft infections reported to date.

The results of simultaneous (Group 1, n = 11) versus staged (Group 2, n = 16) surgical approaches for the management of coexistent AAA and RN were compared. The characteristics of patients in Groups 1 and 2 are detailed in Table I. There were no significant differences between these two groups in terms of patient age, sex, incidental tumor detection, preoperative renal function, AAA presentation, site, surgical approach, or management of RN. The mean postoperative follow-up for Group 1 versus Group 2 was 40.4 months versus 68.5 months, respectively.

The characteristics of both the AAA and the RN and the postoperative outcome for Group 1 versus

Group 2 are delineated in Tables I and II. The mean AAA size for Group 1 and Group 2 was 5.5 cm and 6.8 cm, respectively. The mean tumor size for Group 1 and Group 2 was 5.0 cm and 7.1 cm, respectively. There was no significant difference in pathologic tumor stage, type, focality, or grade between the groups. When simultaneously managed patients were compared with stage-managed patients, there was no statistical difference either in the incidence of perioperative complications (25% versus 37%) or in the length of hospital stay (17 ± 11 versus 16 ± 10 days). There were no aortic graft infections in either group.

Tumor recurrence and patient survival. Recurrent RCC was noted in eight patients. Recurrence was initially detected locally in one patient in the remaining portion of the kidney that underwent operation. Recurrence was manifested in seven patients by the detection of one or more metastatic lesions without local recurrence. Metastatic disease occurred in bone (n = 3), lung (n = 2), or both (n = 1), and one patient had brain metastasis. None of the patients with pathologic stage T1 had recurrent disease. The frequency of developing metastatic disease was not increased in patients undergoing staged versus concurrent procedures.

At the mean follow-up of 57 months, 13 patients were alive without evidence of disease and 14 patients died, 8 of whom died with metastatic disease. The 5-year overall and cancer-specific survival rates were 62% and 81%, respectively (Fig 1). The 5-year cancer-specific patient survival rates were 52% for patients with stage T1 tumors versus 75% for patients with stage T3 tumors ($P > .05$). There was a significant difference in 5-year cancer-specific survival when comparing patients managed simultaneously versus staged (80% versus 35%, $P = .007$) (Fig 2).

DISCUSSION

The widespread use of noninvasive radiologic studies has led to the discovery of an increasing number of patients with incidental renal masses.[8] Asymptomatic AAAs and renal masses are frequently discovered during evaluations for other medical problems. Occasionally, these disease entities present concomitantly. Both are potentially life threatening and may require surgical intervention.

Nevertheless, controversy surrounds the management of concurrent aortic and renal pathologic conditions because of the following reasons: (1) there is a potential for aneurysm rupture if surgical intervention is delayed by staged initial resection of the malignant lesion, (2) there is a risk of metastasis if the aneurysm is resected first, and (3) graft contamination is possible if both procedures are performed simultaneously.

The performance of both surgical procedures in the same setting has the following benefits: (1) The patient is spared a second major abdominal procedure. (2) The surgical approach for both problems is similar, either through the peritoneum or the retroperitoneum. The exposure of the retroperitoneum for the aneurysm repair makes simultaneous left nephrectomy especially attractive; repeat exposure of the retroperitoneum at a second stage is arduous. (3) The risk of postoperative aneurysm rupture from activation of proteolytic enzymes is eliminated.[9] Swanson et al[10] noted this complication at a mean of 10 days postoperatively in 10 patients with a mean AAA diameter of 9.1 cm. Other studies have shown that the incidence of early postoperative rupture in patients with AAA who undergo an unrelated surgical procedure averages 3%.[11]

In 1996, Konety et al[12] reported the retrospective results of 10 patients who underwent combined AAA repair and radical nephrectomy. They compared the outcome with a second group of 10 patients who underwent radical nephrectomy alone and a third group of 12 patients who had aneurysm repair alone. There was no significant difference in outcome among all groups, and, in particular, there were no graft infections.

Demasi et al[13] reported on six patients with coexisting AAA and RCC. Four patients were treated simultaneously with nephrectomy and AAA repair, one was treated with nephrectomy first followed by aneurysm repair, and the last patient was treated conservatively because of metastatic disease. Two patients died, one of a stroke after a combined procedure and the other of an unknown cause.

Howe et al[14] reviewed their experience with incidental RCC in patients undergoing aortic reconstruction. Seven of 80 preoperative CT scans demonstrated suspicious renal lesions (9%). Four partial and three radical nephrectomies were performed before heparinization and completion of the planned aortic procedure. The overall mortality rate was 3%. There was no evidence of local recurrence, distant metastasis, or graft infection over a mean follow-up of 2 years. The authors recommended exploration of all suspicious renal lesions on the basis of the incidence of RCC in this patient population (6%) and concluded that NSS should be considered in patients with renal insufficiency.

Galt et al[15] reported on 10 patients undergoing simultaneous AAA repair and radical nephrectomy for RN. Aneurysm repair preceded nephrectomy in seven

patients. The sequence was reversed in the remaining three. At a mean follow-up of 2 years, there was no evidence of graft infection or recurrent disease.

In this study, we present our experience in the management of patients who were seen with concomitant AAA and RN. Twenty-seven patients were managed surgically. AAA repair was performed at the time of the urologic procedure in 11 patients (41%), before the urologic procedure in 13 patients (48%), or after the urologic procedure in 3 patients (11%). The 5-year overall and cancer-specific survival rates were satisfactory, 62% and 81%, respectively. There were no significant differences in the incidence of complications between staged and simultaneous approaches, although the long-term survival was improved in the patients undergoing simultaneous procedures.

NSS has become a successful form of treatment for patients with localized RN when there is an imperative need to preserve functioning renal parenchyma. This need is present in patients with bilateral RN, RN involving a solitary functioning kidney, chronic renal failure, or unilateral RN and a functioning opposite kidney that is at high risk for future impairment because of an intercurrent disorder. The technical success rate with NSS is excellent, and long-term patient survival free of cancer is comparable to that obtained after radical nephrectomy, particularly for low-stage RCC.[16] The major disadvantage of NSS for RN is the risk of local tumor recurrence in the kidney that underwent operation, which occurs in 4% to 10% of patients. Some of these local recurrences may be a manifestation of undetected multifocal RCC in the renal remnant.

Urinary leakage and fistula formation appear to be the most common complications of NSS. Campbell et al[17] reported an incidence of 17% in their series. A number of risk factors for urinary fistula formation were identified in this series including large tumor size (> 4.0 cm), the requirement for a major reconstruction of the collecting system, and ex vivo surgery. Central tumor location was also a risk factor for fistula formation in this series.

Although radical nephrectomy remains the standard treatment for localized RCC with an anatomically and functionally normal opposite kidney, a growing number of authors are reporting excellent results with NSS in this setting. Clearly, patient selection on the basis of small tumor size has been a significant factor accounting for the favorable outcome after NSS in these studies. Nevertheless, it is important to emphasize that the surgeon's experience with NSS must also be considered, and radical nephrectomy should be performed if there is any concern regarding the ability to completely excise the tumor with a surrounding margin of normal parenchyma. In the clinical setting of coexistent RN and AAA, NSS should only be considered in the presence of imperative indications (patients with bilateral RN, RN involving a solitary functioning kidney, chronic renal insufficiency). Radical nephrectomy should be the treatment of choice in the presence of an anatomically and functionally normal opposite kidney. In case of unilateral RN and a functioning opposite kidney that is at high risk for future impairment because of an intercurrent disorder, NSS should only be considered in peripheral, small, low-stage tumors with the collecting system carefully closed with interrupted or continuous sutures to ensure a watertight closure. Again, the surgeon experience is an important contributing factor under these circumstances.

Endovascular exclusion of AAA was first reported in 1991, and the availability of bifurcated endografts has broadened the applicability of the technique. This approach should be considered in patients with appropriate anatomy as a means of treating the aneurysm and the renal malignancy in rapid succession. Endovascular management of the AAA can be performed first or even concurrently with either radical or partial nephrectomy for the management of the renal tumor.

In summary, coexisting AAA and renal masses will occur in a small proportion of patients. Frequently, the tumor will be discovered incidentally during CT scan evaluation of the aneurysm, or occasionally, an aneurysm will be diagnosed during a hematuria workup. Factors such as patient age, clinical presentation (incidental versus symptomatic), AAA size, site and RCC stage, size, laterality, and presence or absence of comorbid disease should be considered to guide therapeutic plans, specifically the sequence and timing of surgical intervention. A combined approach can be successfully used in low-risk patients without evidence of metastatic disease, which would avoid the morbidity and patient discomfort of two major operations.

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DISCUSSION

Dr John J. Ricotta Stony Brook, (NY). Dr Hafez and his colleagues from the Cleveland Clinic have reported 27 operations for renal neoplasm and aortic aneurysm over an 18-year period. Parenthetically, I'm waiting for the Albany report next year. But this is certainly the largest report to date. And when I realized I had to discuss this and had very little experience, I went back into MEDLINE; I could find fewer than 10 papers in the last 20 years that looked at this. So clearly, we must learn as much as possible from experience such as this where good surgery is done by good and thoughtful surgeons.

The initial cohort was 50 patients; 23 were excluded because of aneurysm size being less than 5 cm or the presence of metastatic neoplasm. This leads to my first two questions.

What is the extent of the urologic evaluation that you would do pre-op, including the extent to which you would search for metastases in patients such as this?

The second question is what happens when you do a subsequent, particularly a late, abdominal aortic aneurysm repair, as we might have expected in some of the patients who had less than 5 cm aneurysms, and they grow? Is this particularly difficult after you've done a radical nephrectomy or perhaps bilateral renal surgery?

About half of the patients in this group had partial nephrectomy or nephron-sparing surgery. What techniques are needed to minimize a urine leak in these patients? Acute renal failure was seen in 11% of the patients. Do the authors feel that the addition of the abdominal aneurysm resection contributed to this acute renal failure, or is it their feeling that this was primarily the result of the degree of nephron loss that was needed in order to perform an appropriate operation?

Could you tell us how you feel about combining abdominal aortic aneurysm resection and bilateral renal surgery? Should these perhaps be staged to decrease the incidence of renal failure? Enlighten us on how you deal with the questionable renal mass that we sometimes see on CT scan. What do you do to decide whether it is a neoplasm and whether you would go ahead with resection at the time of surgery?

As a corollary, what would you do with a patient if there were renal vein involvement with a tumor? How would this alter your management?

Although your survival was quite good, you had significant late mortality from cancer, a recurrent disease. Do you have life table data on this, or can you tell us whether this recurrent disease occurred early or late after surgery? Why was the late mortality so high in the staged group as compared with the combined group? And do you feel that delaying the nephrectomy in your staged group may have increased late mortality from cancer?

Finally, I have a comment. The authors treated three patients with endografts. While this may be appropriate, it certainly can only be justified if the end result is to avoid a major laparotomy. Presumably, in recognition of this fact, the authors comment that perhaps the neoplasms can be treated with laparoscopic techniques for laparoscopic nephrectomy or laparoscopic partial nephrectomy for the renal neoplasms. Are there data in the literature to support the long-term benefit of using laparoscopic techniques for the removal of renal neoplasms? Personally, I believe there comes a time when the pursuit of short stay and minimally invasive techniques runs up against appropriate medical judgment, and I wonder when the authors think they will

reach what Dr O'Donnell talked Friday, that is, "Reductio Ad Absurdum." Thank you very much.

Dr Khaled Hafez. Thank you, Dr Ricotta, for the nice comments. And I'm going to start to address the first question, which was the preoperative evaluation for patients with renal cell cancer. Classically, what we do is a thorough clinical exam. As far as the labs are concerned, we check the LFTs and alkaline phosphatase and usually they get a CT scan of the abdomen with a chest x-ray. If there is any question in the chest x-ray, they get a CT scan of the chest. If the LFTs or alkaline phosphatase is high, and there's a question of bone metastases, they get a bone scan.

The second question was, is it going to be difficult to do a radical nephrectomy followed by an aortic aneurysm. I don't think this would be an issue if it's discovered late or if the aneurysm was less than 5 cm and there was no urgent indication to do the repair. I think it could be delayed for a second procedure.

The third question addresses the possibilities of urine leak. Classically doing a radical nephrectomy has no risk of having urine leaks. There are various techniques to prevent a leak during the performance of a partial nephrectomy, depending on the location and size of the tumor. For a peripheral tumor, meticulous closure of the collecting system should be enough. For a centrally located tumor, usually a double J stent should be placed intraoperatively to decrease the risk of postoperative leak, in addition, of course, to clearly close the collecting system meticulously.

The fourth question about acute renal failure and the causes and combined approach, I think the reason of the high incidence of renal failure in these patients was combined for both reduction in renal mass and clamping time with acute renal failure due to that, too.

The feeling of attacking both tumors at the same time, at the timing of the aneurysm, what we've been doing classically in the management of renal cell cancer for bilateral tumors, irrespective of the presence or absence of aneurysm, is that we usually try to do the partial nephrectomy on one side and stage the radical nephrectomy on the other side, to keep the patient at least with some protection from the contralateral kidney. We've been doing some combined bilateral nephrectomies at the same time with the possibility of not having any clamps on the renal artery during the procedure. But classically it should be a staged procedure if it's an extensive bilateral tumor.

Your sixth question was about evaluation of different renal masses. Most solid renal masses are malignancies with the exception of oncocytomas and angiomyolipomas. And with a CT scan preoperatively, you should be able to tell if it has a high fat content, then most likely it's a angiomyolipoma. Other than that, most hard tumors should be evaluated and should be explored, with the exception of venous cysts, and there's different classifications for venous cysts.

Addressing the question of renal vein involvement. This depends definitely on the level of the thrombus. If the thrombus is intrarenal or even onto the vena cava, which is stage 1, I think it should be safe to address them both at the same time. If it's infrahepatic, this would carry the high risk of more prolonged procedure. But definitely if it's suprahepatic, supradiaphragmatic, even reaching the right atrium, with a possibility of cardiopulmonary circulatory arrest, then I think it would be too risky to do them both at the same time. I think the tumor should be addressed first and then the aneurysm.

The reason about late recurrences, it's well-known for renal cell cancer to metastasize and recur up to 20 years after the primary surgery. And this is why it can recur and this is why the follow-up until now is not very clear for patients that have been out for 15 years or so.

The other question about why did we have a difference in cancer-specific survivor between the staged and the combined group. Until now, the only reason we can think of right now is that maybe the length of surgery was an issue, for 3 months or so, to develop metastasis, especially if it's an extensive tumor. It's not very clear if there's any other issues concerned. The follow-up in the combined group is longer than the follow-up in the staged group, too.

We presented the results about laparoscopic radical nephrectomy, a partial nephrectomy, at the American Urological Association a few days ago. We have a series of 100 patients that were performed laparoscopically with a mean follow-up time of 24 months and with excellent results, no recurrences until now, and no seedling, and we felt that laparoscopic nephrectomy in the selected patients, and these criteria for selection for laparoscopic nephrectomy, depending on tumor stage, tumor size, definitely presence or absence of renal vein involvement. For the time being I think it could be with a future questionable possibility to perform laparoscopic surgery on endograft fixation of the abdominal aortic aneurysm. Thanks a lot.

Dr Mark B. Kahn (Philadelphia, Pa). I think the issue is what is an acceptable leak rate if the patient opts for a nephron-sparing nephrectomy? Because there really, as you stated, isn't much downside, if the patient is stable after you fix your aneurysm. There isn't much downside to clipping the ureter and ligating the renal vessels and doing the radical nephrectomy. So I'm curious as to what your leak rate is and what you would consider an acceptable leak rate in the face of a new retroperitoneal graft.

Dr Hafez. The acceptable leak rate for a partial nephrectomy, of course, depends on the size of the tumor and the location of the tumor. But we send patients home with a retroperitoneal drain and a leak between 200 cc and 400 cc every day. This is for partial nephrectomies not with aneurysm.

With an aneurysm, I think it's definitely a higher risk. And putting in mind that this urine leak could be most probably a sterile leak, we would accept 200 cc to be sent home with a retroperitoneal drain.

Dr Kahn. When it's leaking the 200 cc a day, where is it leaking to?

Dr Hafez. It leaks into the retroperitoneum, and it's drained outside.

Dr Kahn. So is that a source of infection?

Dr Hafez. It could be definitely a source of infection. I think what we should do in this patient population, these should be followed meticulously. And if we found that this thing is not improving and it's getting worse, a double J stent should be placed as an outpatient procedure easily.

Dr Kahn. Well, I guess what I'm wondering is, should partial nephrectomy be offered with an increased risk of infection when you're putting in an aortic graft?

Dr Hafez. I think it should be offered with being more meticulous during closure and putting a double J stent preoperatively even if you would like.